FOURTH FIVE-YEAR REVIEW REPORT FOR HOCOMONCO POND SUPERFUND SITE WESTBOROUGH, MASSACHUSETTS WORCESTER COUNTY

Prepared by

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ADAFs	Age-Dependent Adjustment Factors
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
cPAHs	carcinogenic Poly-Aromatic Hydrocarbons
CSFs	Cancer Slope Factors
DNAPL	Dense Non-Aqueous Phase Liquid
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
Feet bgs	Feet Below Ground Surface
ICs	Institutional Controls
IGCLs	Interim Groundwater Cleanup Levels (aka: RAOs)
LTMP	Long-Term Monitoring Program
MA	Massachusetts
MassDEP	Massachusetts Department of Environmental Protection
MCLs	Maximum Contaminant Levels
ug/l	microgram per liter
mg/l	milligram per liter
NAULs	Notices of Activity and Use Limitations (aka: ICs)
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
PAHs	Poly-Aromatic Hydrocarbons
PRP	Potentially Responsible Party
RAOs	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SDD	Supplemental Decision Document
SIM	Selective Ion Monitoring
TBC	To Be Considered
TI	Technical Impracticability
TOC	Total Organic Content

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fourth FYR for the Hocomonco Pond Superfund (Site) located in the Town of Westborough, Worcester County, Massachusetts. The triggering action for this policy review was the signing of the previous FYR on September 25, 2014. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the site above levels that allow for Unlimited Use and Unrestricted Exposure (UU/UE).

There is one operable unit at the Site, therefore the entire Site is addressed in this FYR.

The Hocomonco Pond Superfund Site Five-Year Review was led by Derrick Golden, EPA Remedial Project Manager. Participants of the EPA case team also included: ZaNetta Purnell, EPA Community Involvement Coordinator; Bart Hoskins, EPA Ecological Risk Assessor; Rick Sugatt, EPA Human Health Risk Assessor; and Ruthann Sherman, EPA Enforcement Counsel. Paul Craffey, the MassDEP Project Manager, assisted the EPA case team with this review. In addition, Mike Bollinger, the Environmental Manager for the PRP, Beazer East, was notified of the initiation of the 2019 five-year review and provided data and relevant Site information. The review began on November 8, 2019, when the RPM held a conference call with Mr. Bollinger to discuss the upcoming 2019, review and data needs.

Site Background

The Site is approximately 23-acre in size and is located off of Otis Street, in the Town of Westborough, Worcester county, Massachusetts. The Site is located in a light industrial area of the town and is bordered to the northwest by Hocomonco Pond, a 27-acre shallow freshwater pond, to the east by Otis Street and to the south by the Smith Valve Parkway. According to the 2010 US Census, the population of Westborough is approximately 18,272 people. A Site location map is included as Figure 1. The Site was listed on the National Priorities List (NPL) in 1983 and additional information and historical reports can be viewed on EPA's website at: www.epa.gov/superfund/hocomonco.

The natural topography of the property is relatively flat, with the exception of a steep downward grade which slopes to the shore of Hocomonco Pond, and a more gradual slope which dips into the Kettle Pond area. Gradual slopes also form the perimeters of the former capped lagoon and capped landfill areas. The property is largely wooded with the exception of the former lagoon and landfill areas, which are flat and vegetated with grass. In addition, the building which contains the former Groundwater Treatment System (GTS), is located on the eastern portion of the Site, near the former landfill.

The Site lies within a Zone II aquifer and groundwater flows northward towards and discharges into the Hocomonco Pond. In the extreme northern portion of the Site, Hocomonco Pond discharges from its northeast end and flows under Otis Street into wetlands. The hydrogeologic conditions present at the Site indicate that Hocomonco Pond provides a constant head boundary which prevents Site contaminants from migrating northwest toward the Otis Street municipal town wells. Site contaminants were not detected in either of the town wells during the Remedial Investigation or during subsequent routine testing.

Former Land Use

Wood treating operations were conducted on the Site between 1928 and 1946. These activities consisted of saturating wood products, with creosote to preserve them. Waste produced during these operations was discharged into the 1.7 acre unlined (former) lagoon. When the lagoon was filled with waste creosote, sludge, and water, its contents were then pumped into two depressed areas on-site, approximately 1.0 acre in size, referred to as the Kettle Pond area.

After 1946, the facility was converted to an asphalt mixing plant. Aggregate and asphalt wastes associated with this operation were discarded on the Site. The facility was later converted into a cement plant where dry cement was sold in bulk.

Current Land Use

A copy of the Town of Westborough Zoning Map, revised 2017, which was obtained from the town of Westborough's website, indicates that the Site is owned by the town and is currently zoned as M-1, which is designated as "Town owned." The land surrounding the Site is zoned as Industrial B. See Appendix A, for a copy of the 2017, Westborough zoning map .

Currently, the Site is not being actively used by the town. A regional commuter train station is located across the street from the Site on Smith Valve Parkway and there are no private residences in immediate proximity to the Site. There are approximately 40 residential homes within a ½ mile radius, most of which are located to the south, along Fisher Street.

There are no estimated habitats of rare wetland wildlife or priority habitats for state-listed rare species within one mile of the Site.

Reasonably Anticipated Future Land Use

The town of Westborough currently owns the properties that comprises the Site. Over the years, the town has considered several different reuse options which include: passive recreational use (i.e., walking and biking), open space preservation, and utilizing the existing groundwater treatment building for storing paper copies of town documents (i.e., historical plans, permits etc.). The PRP, Beazer, is currently obtaining bids, from qualified contractors, to properly dismantle and dispose of the former groundwater treatment system equipment, (i.e., above ground storage tanks, piping, wiring, etc.). The dismantling of the former treatment plant will be conducted in accordance with the *Treatment Plant Decommissioning Work Plan,* dated October 13, 2016, and EPA's May 23, 2017, approval letter.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Hocomonco Pond Superfund Site		
EPA ID: MAD980732341		
Region: 1	**State: MA**	**City/County:** Westborough/Worcester County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA *[If "Other Federal Agency", enter Agency name]*:		
Author name (Federal or State Project Manager): Derrick Golden		
Author affiliation: Remedial Project Manager – EPA Region 1		
Review period: 11/8/2018 - 9/25/2019		
Date of site inspection: 8/22/2019		
Type of review: Policy		
Review number: 4		
Triggering action date: 9/25/2014		
Due date *(five years after triggering action date)*: 9/25/2019		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The Site was used for wood treating operations between 1928 and 1946, by preserving wood with creosote. In 1976, the town of Westborough installed an open ended storm drain which crossed a portion of the former lagoon that contained creosotes wastes, which caused creosote to enter the storm drain, which ultimately discharged directly into Hocomonco Pond. In November 1979 & April of 1982, the Massachusetts Division of Fisheries & Wildlife, investigated two fish kills at Hocomonco Pond, that were attributed to the creosote contamination. From 1979 through 1982, studies and investigations were conducted to evaluate the source and extent of creosote contamination. The Site was listed on the National Priorities List (NPL) in 1983.

The results from the 1985 Remedial Investigation (RI) identified four primary areas of contamination on the Site: (1) the Kettle Pond area; (2) Hocomonco Pond and its discharge stream; (3) the Former Lagoon area; and (4) Otis Street. In addition, the RI identified three small isolated areas: contaminated soil near

MW-1; tank bases adjacent to the former lagoon; and sediment in the southwest drainage channel. The predominant contaminants found in all of these areas of contamination were creosote compounds, primarily polycyclic aromatic hydrocarbons (PAHs) such as acenaphthene, naphthalene, acenaphthylene, fluorene, phenanthrene, dibenzofuran, and 2-methylnaphthalene. These areas are identified and shown on Figure 2. A brief description of each of the areas of contamination identified in the RI is provided below, followed by a summary of the endangerment assessment that was performed to address public health and environmental concerns at the Site.

(1) Kettle Pond Area

Creosote contamination was detected in soils at concentrations up to 483 mg/kg at a depth of 0 to 2 feet; and a concentration of up to 55 mg/kg was detected at a depth of 20 feet below ground surface (bgs). The contamination extended below the water table, which was located at approximately 8 feet bgs, and was visible in soil borings to a depth of 17 feet bgs. The RI estimated the volume of contaminated soil to be approximately 24,000 cubic yards with an aerial extent of approximately one acre. Contamination extended to the western bank of Otis Street and north to Hocomonco Pond. Downgradient of Kettle Pond, groundwater was contaminated with creosote compounds and phenolic compounds at parts per million concentrations. Iron and manganese were detected at concentrations which exceeded secondary drinking water standards. Surface soil adjacent to Hocomonco Pond also contained creosote compounds

(2) Hocomonco Pond

The RI determined that creosote-contaminated leachate migrated from the former lagoon into the open-jointed storm drain adjacent to the former lagoon, and discharged into Hocomonco Pond. The creosote compounds contaminated the sediments in the discharge stream and along the shoreline of the pond. Most of the metals detected exceeded background levels in both pond and stream sediments. Migration via the storm drain was noted as the primary source of contamination in Hocomonco Pond and the discharge stream. Contaminated surface water was found in the pond only within the oil boom area at the storm drain discharge. Contamination was not found in surface water beyond the oil boom or in the discharge stream exiting the pond near Otis Street.

(3) Former Lagoon Area

Creosote contamination was detected in the soil near the surface and at depths ranging from 5 to 20 feet bgs. Creosote product was observed in the upper 15 feet of the soil, above the groundwater table. The RI estimated the volume of contaminated soil in the former lagoon area to be approximately 18,000 cubic yards with an estimated aerial extent of approximately 1.7 acres. Groundwater contamination was not found in wells located downgradient of the former lagoon. Observations made during test pit and soil boring operations suggested that downward migration of contaminants was apparently impeded by impervious layers of sludge and fines in the bottom of the lagoon. The RI concluded that hydrogeologic conditions in the area would prevent migration of contaminants deep into the aquifer and that seepage from the lagoon into the groundwater would likely flow laterally and discharge into Hocomonco Pond.

(4) Otis Street

Creosote contamination was not detected in soils or groundwater along the eastern embankment of Otis Street; metals above background levels were found in both soil and groundwater. Manganese was the only compound detected in the groundwater east of Otis Street that exceeded secondary drinking water

standards. Stream sediments containing creosote contamination were detected 300 feet downstream of Otis Street.

(5) Isolated Areas

The RI reported that limited creosote contamination was found in the three isolated areas. Shallow soils near MW-1 contained creosote contamination ranging from 2.5 to 9 mg/kg. Creosote contaminants were detected in sediments in the southwest drainage channel at concentrations ranging from 6 to 39 mg/kg and oily creosote compounds were found in the bottom of the former tank bases.

EPA issued Record of Decision (ROD) on September 30, 1985, due to contamination found at the Site. In addition, three Explanation of Significant Differences (ESDs) were issued, in 1992, 1999, and in 2013. The ROD and ESD components are discussed in further detail under the Response Actions section, page 9 of this FYR.

Contaminants of Concern (COCs) and Limits of Excavation

The Consent Decree and Remedial Design/Remedial Actions plans included a requirement that EPA establish the horizontal and vertical limits of excavation in the Kettle Pond area, Hocomonco Pond, and its discharge stream in a supplemental decision document. On September 28, 1992, EPA issued a final Supplemental Decision Document (SDD) entitled: *Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soil*. The ROD required that the 1992, SDD establish the vertical and horizontal extent of excavation and also established cleanup levels for soil, sediment, and groundwater throughout the Site.

Based on the pre-design investigation results, and other studies, EPA identified Contaminants of Concern (COCs) for the site. The COCs identified for the Hocomonco Pond Site include benzene, toluene, ethylbenzene, and xylenes (BTEX), noncarcinogenic and carcinogenic PAHs, arsenic, and chromium.

Receptors

Based on the soil and sediment data collected during the pre-design investigations, EPA established cleanup standards for Hocomonco Pond, the discharge stream, Kettle Pond area, and the isolated areas. Exposure pathways presenting unacceptable risks for ecological receptors included potential exposure to shallow sediments of Hocomonco Pond and the former Kettle Pond area. Cleanup levels were established based on risks to human health from potential exposure via dermal contact and ingestion as well as risks to aquatic life. No cleanup levels were established for surface water or fish since there were no unacceptable risks in these media.

These exposure pathways were eliminated through implementation of the remedy by excavating contaminated soil/waste and on-Site disposal into the double-lined landfill, sealing of the storm drain, and by the removal of the shallow sediment from the southeastern portion of Hocomonco Pond and its discharge stream.

Response Actions

Remedy Components - 1985 Record of Decision

The Record of Decision (ROD) for the site was signed on September 30, 1985 and specified a multi-component remedy to address each of the areas of contamination at the Site, each of which are described below:

Kettle Pond Area. The remedy selected for the Kettle Pond area involved excavation of contaminated soil/waste and on-Site disposal into a newly constructed double-lined landfill. A human health based cleanup level of *4 mg/kg cPAHs* was established for surface soils (less than 2 feet) in the Kettle Pond area. To meet this standard, EPA determined that removal of the top 4 feet of soil, which totaled approximately 4,200 cubic yards was necessary. The remedy also included dewatering Kettle Pond to lower the groundwater level prior to and during excavation. A groundwater pump and treatment system would be constructed to lower the groundwater level and to extract and treat contaminated groundwater.

Hocomonco Pond. The remedy selected for Hocomonco Pond involved the mechanical dredging of contaminated sediments with on-Site disposal at either the former lagoon area (prior to construction of the cap) or at the newly constructed double-lined landfill. A human health based cleanup level of *4 mg/kg cPAHs* was established for shallow sediments in Hocomonco Pond. In the shallow sediment of the eastern portion of the pond, a cleanup level of *35 mg/kg total PAHs* and *4 mg/kg phenanthrene* was established for protection of aquatic life. EPA determined that dredging pond sediments along approximately 4,000 feet of shoreline at depths ranging from 0.5 to 1.5 feet bgs was required to meet the cleanup standard. The total volume of sediments required to be removed was approximately 1,840 cubic yards.

Hocomonco Discharge Stream - A human health based cleanup level of *7 mg/kg cPAHs* was established for the contaminated sediment in the upper portion of the discharge stream, from Otis Street east approximately 440 feet downgradient of Hocomonco Pond. A cleanup level of *35 mg/kg total PAHs* and *4 mg/kg for phenanthrene*, in shallow sediments for the entire stream and adjacent soils, was established for the protection of aquatic life. EPA determined that excavation of approximately 500 cubic yards of sediments in the upper portion of the discharge stream was required. Excavation of approximately 50 cubic yards of contaminated sediment in the lower portion of the discharge stream was also required.

Former Lagoon Area - The remedy selected for the former lagoon area involved Site grading, construction of a cap, removal/disposal of the storm drain pipe that had been installed along the eastern side of the former lagoon, and installation of a new storm drain pipe outside of the former lagoon limits. This alternative was selected since all soil contamination was located above the water table; therefore, containment of the waste material under the cap would prevent migration to Hocomonco Pond and groundwater. A deed restriction was also required for the area of the cap to prevent future development and/or disturbance of the cap.

Otis Street - The remedy selected for Otis Street involved sealing the open-jointed storm drainage pipe along the east side of the street. This alternative was selected since it would prevent the migration of contamination from the drainage pipe into Hocomonco Pond, the discharge stream, and adjacent wetlands.

Isolated Areas - The remedy selected involved the removal of the tank bases, contaminated soil near MW-1, and contaminated sediment from the southwest storm drain channel, and consolidation of the materials either on Site into the former lagoon area prior to construction of the cap and/or at an approved offsite landfill facility. This option was selected to eliminate the potential exposure risk to humans and animals from contaminants in these isolated areas. The human health based cleanup level for soils in the former tank farm area, southwest storm drain, and around MW-1 was *4 mg/kg cPAHs.* Since the tank base and the soil adjacent to the tank base were contaminated, EPA determined that excavation of approximately 940 cubic yards of soil to a depth of 2 feet bgs was required. Approximately 730 cubic yards was required to be excavated near MW-1.

The individual Remedial Action Objectives (RAOs) described in the 1985 ROD for each area of contamination are summarized in the Table 1 below.

Table 1
Remedial Action Objectives (RAOs)

Remedial Action Objectives (per EPA 1985 ROD)	Areas of Contamination				
	Former Lagoon	Kettle Pond	Hocomonco Pond & Discharge Stream	Otis Street	Isolated Areas
Eliminate inhalation, direct contact and/or ingestion exposure pathways	X	X	X	X	X
Eliminate the contaminant migration potential to downstream areas and to surface waters	X		X	X	X
Ensure no future groundwater contamination	X				
Eliminate impacts on wetlands	X	X		X	X
Eliminate groundwater contamination in this area and east of Otis Street		X			
Eliminate future potential impacts to wetlands and fisheries (e.g. the ingestion exposure pathway)			X		
Enhance future recreational usage of Hocomonco Pond			X		

On January 10, 1988, a Consent Decree was entered into between the EPA, the Commonwealth of Massachusetts, and the following parties: Beazer East, Inc. (Beazer), Chicago Bridge & Iron Co., Smith Valve Corp., Massachusetts Department of Public Works (DPW), and the Town of Westborough. The Consent Decree set forth activities that Beazer would be required to carry out in order to implement the remedies specified in the ROD. The other PRPs agreed to make settlement payments to Beazer, and they would implement the remedy.

Remedy Component – 1992 Explanation of Significant Differences

In the early 1990s, the PRP conducted pre-design investigations including sediment, soil, groundwater, and fish tissue sampling, to further refine the extent of contamination in the different areas of the site. The PRP also conducted investigations at Kettle Pond. These investigations resulted in new information which raised issues regarding the effectiveness and implementability of the remedy specified in the ROD for the Kettle Pond area.

In response to this new information, in July 1992, EPA issued the first Explanation of Significant Differences (ESD) for the Site and modified the remedy selected for the Kettle Pond area.

The remedies selected for the other areas of the Site were not modified. To ensure that the Kettle Pond remedy remained protective of human health, welfare, and the environment, the 1992 ESD set forth the following changes:

- The requirement for sheet piling and the dry excavation of sediments and soils was replaced with a requirement for wet excavation of shallow contaminated material to a maximum depth of 5 feet;

- The requirement for excavating, dewatering, and landfilling the deeper contaminated soil was replaced with a requirement for in-situ bioremediation and soil flushing; and

- Since DNAPL was discovered in the deep overburden, the ESD required product recovery prior to and/or during in-situ bioremediation and either on- or off-site treatment or product reuse offsite.

Remedy Component – 1992 Supplemental Decision Document (SDD)

Following issuance of the 1992 ESD, EPA established cleanup levels for groundwater, sediments, and soil and established the limits of excavation in a 1992 Supplemental Decision Document (SDD). All excavation and dredging activities were completed by 1996 and certification reports documenting completion of the remedial activities were submitted and approved by EPA. DNAPL recovery operations, required by the 1992 ESD, began in 1995. The in-situ bioremediation system also required by the 1992 ESD was constructed and began operation, but was not successful due to significant iron fouling. The groundwater cleanup levels established by EPA in the SDD are the Maximum Concentration Limits (MCLs) and non-zero MCL goals (MCLGs) for the COCs. However, since MCLs had not been established for non-carcinogenic PAHs and some carcinogenic PAHs (cPAHs), risk-based criteria were used to establish interim groundwater cleanup levels. The interim cleanup levels and the criteria upon which they were based, are shown below in Table 2, page 13 of this FYR.

Remedy Component - 1997 Technical Impracticability Waiver and 1999 Explanation of Significant Differences DSG

The interim groundwater cleanup levels established in the SDD assumed that groundwater restoration was an achievable goal. However, a technical impracticability (TI) investigation was completed in 1997, which identified two technical Impracticability (TI) zones where it was determined that groundwater restoration was not practicable due to the presence of Dense Non-Aqueous DNAPL. On September 21, 1999, EPA issued a second ESD that waived the groundwater ARARs and interim cleanup levels in the two TI zones identified in the PRP's TI report. The 1999 ESD also required that DNAPL recovery continue until it is determined to be "no longer technically practicable."

EPA and MassDEP concluded that this modified remedy was adequately protective of human health and the environment because institutional controls, long-term monitoring, and continuing DNAPL recovery activities were required as part of the TI waiver. The 1999 ESD allowed the in-situ bioremediation system to be discontinued, but required DNAPL recovery to "continue until the EPA and MADEP give a written approval stating otherwise." The 1999 ESD also required continued groundwater monitoring and surface water and sediment sampling, to ensure that the groundwater is hydraulically contained, and contaminant levels do not increase in concentrations or extent. Should levels increase, the ESD stated that additional site work or engineering controls may be required. Finally, the 1999 ESD required that a

deed restriction be placed on the Hocomonco Pond property to prohibit groundwater extraction, and the PRP implemented a long term monitoring plan (LTMP), as required by the 1999 ESD.

Remedy Component – 2013 Explanation of Significant Differences & DNAPL Recovery

This ESD was issued to require the continued removal of DNAPL by passive recovery methods. The 1992 ESD had required that DNAPL be "removed through pumping prior to or during bioremediation." The 1999 ESD stated that "DNAPL recovery shall continue until such time that it can be demonstrated that it is no longer technically practicable." While the 1999 ESD established a TI waiver ending active pumping efforts to achieve cleanup levels, the above statement implied that active pumping to remove DNAPL was required to continue. Passive recovery efforts performed since 2003 have demonstrated that active pumping is not required to achieve meaningful DNAPL recovery. Extensive groundwater monitoring concludes that the DNAPL is not migrating, and no potential down gradient receptors have been identified.

The ESD also establishes a new TI zone boundary in the area just down gradient of the former lagoon. Since 2002, concentrations of naphthalene and benzene periodically exceeded groundwater cleanup levels in monitoring well MLC-2. Since 2007, concentrations of benzene also exceeded its cleanup level in MLC-3. Both of these wells are located down gradient and just outside of the existing TI zone associated with the former lagoon area. See Figures 2 & 3. The shore of Hocomonco Pond is about 200 feet down gradient from the former lagoon area. Previous studies indicated that the pond provides a natural hydraulic barrier. In 2012, the PRP completed a vertical profile boring and two new well pairs: MLC-5S/D and MLC-6S/D, approximately 100 feet down gradient of MLC-2 and MLC-3. See the below Table 2, on page 13 of this FYR.

Groundwater samples collected from the profile boring in November 2012 and from the new well pairs in January 2013 showed no exceedances of interim cleanup levels. Therefore, the northwest boundary of the TI zone around the former lagoon area was extended by approximately 100 feet and remain south of the new sentinel monitoring wells MLC-5S/D and MLC-6S/D. This represents a minor expansion of the established 1999 TI zone. MLC-5S/D and MLC-6S/D are the new sentinel wells and were incorporated into the monitoring program to ensure compliance with the expanded TI boundary. There are no known receptors located down gradient of these new sentinel wells. Hocomonco Pond is located approximately 100 feet down gradient of these new sentinel wells and is a natural hydraulic barrier to further groundwater migration. For over twenty years, there has been an active long term sediment and groundwater monitoring program established for the Site. Appendix D contains groundwater data from 2014 through 2018, which demonstrates that groundwater outside of the TI zone remain below Interim Groundwater Cleanup Levels (IGCLs). The IGCLs are listed below in Table 2, of this FYR.

Groundwater Cleanup Levels

TABLE 2
INTERIM GROUNDWATER CLEANUP LEVELS

Constituent	Interim Cleanup Level (µg/l)	Reference (criteria)
PAH – carcinogenic		
Benzo(a)anthracene	None	-
Benzo(a)pyrene	0.2	final MCL
Benzo(b)fluoranthene	None	-
Benzo(k)fluoranthene	None	-
Chrysene	None	-
Dibenzo(a,h)anthracene	None	-
Indeno(1,2,3-cd)pyrene	None	-
PAH – noncarcinogenic		
Acenaphthene	2,200	risk-based
Acenaphthylene	None	-
Anthracene	11,000	risk-based
Benzo(g,h,i)perylene	None	-
Fluoranthene	1,500	risk-based
Fluorene	1,500	risk-based
Naphthalene	1,500	risk-based
Phenanthrene	None	-
Pyrene	1,100	risk-based
VOCs		
Benzene	5	final MCL
Ethylbenzene	700	final MCLG
Toluene	1,000	final MCLG
Xylenes (total)	10,000	final MCLG
Inorganics		
Arsenic	50	final MCL
Chromium (total)	100	final MCLG

None = no interim cleanup level established

The SDD stated that these interim levels, which were applied to groundwater within the saturated zone beneath the entire site, could be reassessed during implementation of the remedy and at the completion of the remedial action to ensure its protectiveness. The SDD allowed for periodic assessments and a possible re-evaluation of performance standards associated with the groundwater treatment remedy. The SDD required a risk assessment to evaluate the potential risk of consumption of site groundwater once

the groundwater ARARs were achieved. As discussed above in the 1997 ESD and TI section, EPA waived ARAR's for groundwater cleanup levels due to the presence of DNAPLs.

Sediment Cleanup Levels

The human health based cleanup level of *4 mg/kg cPAHs* was established for shallow sediments in Hocomonco Pond. In the shallow sediment of the eastern portion of the pond, a sediment cleanup level of *35 mg/kg total PAHs* was established for protection of aquatic life. However, since the human health cleanup level was more stringent than the ecological cleanup levels, a sediment cleanup level of *4 mg/kg for cPAHs* was selected for protection of both human health and ecological receptors. In addition, the sediment cleanup levels were based on Site-specific sediment organic carbon concentrations using three methods and then the average of the three methods was used for the sediment cleanup levels.

Status of Implementation

Below is a time line of when the remedy components for the Site, were completed:

1979-1985 – Various studies and investigations were conducted to evaluate the source and extent of creosote contamination and evaluate methods to remove or contain the contamination (attributed to creosote and water leaking into the storm drain laid adjacent to the former lagoon and discharging to Hocomonco Pond).

September 1985 - ROD selecting the Site Remedy was Excavation during reconstruction of Otis Street resulted in disturbance of contamination in the Kettle Pond area and redistribution of contaminated soil in the road embankment adjacent to the Kettle Pond area.

January 1990 - Relocation of the storm drain (initially installed in 1976) was completed.

July 1992 - First Explanation of Significant Differences (ESD), changing the remedy for the Kettle Pond area, was issued by the EPA

September 1992 - Supplemental Decision Document entitled "Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soils" was issued by the EPA.

1993-1994 - Groundwater treatment plant constructed.

1994 - Excavation of the Kettle Pond area completed; construction of the on-Site double-lined landfill for contaminated soil and sediments completed.

1995 - Completed dredging of contaminated sediment from Hocomonco Pond and discharge stream and the sealing and lining of Otis Street storm drain.

1995- current – DNAPL recovery began and continues.

1996 - Soils from the former tank farm area and former storm drain excavated; covers on landfill and former lagoon completed.

April 1998 - Report Demonstrating the "Technical Impracticability of Restoring Groundwater at the Hocomonco Pond Site" submitted by the PRP.

September 1999 - Second ESD and associated TI waiver implemented.

September 1999 - Preliminary Close-Out Report" issued by EPA.

September 2000 – Interim Remedial Action Report issued by EPA.

September 2004, - First Five Year Review issues by EPA.

November 2005 - Final Long-Term Monitoring Plan" (LTMP) submitted by the PRP.

September 2009 – Second Five Year Review

September 2012 – Long Term Sediment Sampling Report.

September 2013 - Third ESD issued to extend the TI zone boundary and modify the DNAPL recovery method from active to passive.

September 2014 – Third Five Year Review completed

Institutional Controls (ICs)

On November 30, 2017, ICs, in the form of a Notice of Activity and Use Limitations (NAULs) was recorded at the Worcester Registry of Deeds, for the Site.

Table 2
Summary of Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Landfill and Former Lagoon and Restricted Areas	Yes	Yes	Worcester Registry of Deeds in Book 10480, Page 325	No excavation, digging, drilling, or other intrusive activity into or disturbance of the surface of the ground and/or the underlying soil; no residential, school child care or agricultural uses; no new structures, no groundwater extraction; continued groundwater sampling	NOTICE OF ACTIVITY AND USE LIMITATION, 11/30/2017

Systems Operations/Operation and Maintenance and Frequency- Since 2014 FYR

- DNAPL Gauging and Recovery – Monthly
- Drum Inspections – Weekly
- Landfill Cap Inspections – Annually
- Former Lagoon Area Cap Inspection – Annually
- Groundwater Sampling and Analysis – Annually
- Hocomonco Pond Sediment Sampling – Annually
- Status Reporting – Quarterly
- Waste Management/drum disposal - As Needed
- Cap Mowing – As Needed

Groundwater monitoring wells and sediment are sampled annually, most recently in November of 2018 and December 2018, respectively. In addition, passive DNAPL monitoring and recovery continues. On a monthly basis, wells where DNAPL has been historically detected, are gauged for the presence of DNAPL. If the DNAPL thickness is great than 0.3 feet, it is removed manually and placed into 55 gallon drums onsite and then properly disposed of. Since the 2014 Five Year Review was completed until June of 2019, approximately 3,136 gallons of DNAPL was recovered.

The PRP submits quarterly status reports to the United States Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP), which summarize the results of the routine monitoring and any issues.

To ensure the continued integrity the Landfill and Former Lagoon Areas, periodic site inspections, mowing of grass, and maintenance (repairing animal burrows) of the covers is conducted.

There have been no known issues with the implementation of the above operation and maintenance items.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the **last** five-year review as well as the recommendations from the **last** five-year review and the current status of those recommendations.

Table 3: Protectiveness Determinations/Statements from the 2014 FYR

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Short-term Protective	The remedy currently protects human health and the environment because physical access to the Site is restricted and there are no potable wells. However, in order for the remedy to be protective in the long term, the following actions need to be taken: deed restrictions need to be finalized and recorded, an updated O&M plan must be finalized, and active monitoring of sediments and groundwater must continue to ensure long-term protectiveness.

Table 4: Status of Recommendations from the 2014 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
Sitewide	Deed restrictions are not in place	Finalize draft documents and record deed restrictions	Completed	Completed	11/30/2017
Sitewide	Updated O&M plan consistent with current activities is required.	Finalize an updated O&M plan.	Completed	Completed	8/1/2014
Sitewide	Bulk sediment concentrations intermittently exceed ecological cleanup goals.	Continue annual monitoring. If sample results continue to exceed cleanup levels, and an increasing trend in concentrations becomes apparent, perform additional toxicity testing.	Ongoing	Ongoing	Ongoing

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available by press release, *EPA begins 14 reviews of Massachusetts Superfund Site Cleanups this Year*, on February 21, 2019, stating that there was a five-year review and inviting the public to submit any comments to the U.S. EPA. The results of the review and the report will be made available at the Site information repository located at Westborough Public Library, 55 W Main Street, Westborough, MA 01581. Additionally, this and other documents are available at: www.epa.gov/superfund/hocomonco.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The MassDEP Project Manager, the Town of Westborough's Conservation Officer, and the Environmental Project Manager for Beazer East, Inc., submitted interview responses via email as part of the five-year review process. The results of these interviews are summarized below. The actual interview forms are included Appendix C.

The MassDEP Project Manager stated they receive and review quarterly Site status reports and other correspondence related to site activities. In addition, EPA and the PRP group keep MassDEP informed on Site related activities. Regarding future reuse, the town has expressed an interest in the property, possibly using the existing building for storage.

The Project Manager for Beazer East, Inc stated that the operation and maintenance contractor for Beazer East, Inc. makes site visits on a scheduled basis to perform inspections and OM&M activities in accordance with the requirements of the site OM&M manual. Beazer East, Inc states they will continue

to work with EPA to identify and implement, as appropriate, optimization opportunities related to site operations and monitoring while maintaining the ongoing protectiveness of the site remedies.

Data Review

Groundwater

Groundwater monitoring and groundwater level measurements are conducted on an annual basis at the Site in accordance with the Revised Long-Term Monitoring, dated December 2014. The purpose for monitoring groundwater is to ensure that creosote waste, downgradient from the former lagoon and landfill areas, is not leaching to groundwater, and to ensure the TI zone boundary remains stable. In 2018, nine groundwater samples and two QA/QC samples were obtained from the following groundwater monitoring wells: LF-1, LF-2, LF-3, LF-4, MLC-1, MLC-4, MLC-5D, MLC-5S, and MLC-6S. These wells are located within and adjacent to the TI zone and include the lagoon, and the former landfill areas. See Figures 2 & 3.

Wells LF-4 and MLC-4 are located downgradient of the landfill and former lagoon areas respectively, and the sampling results were all below the Interim Groundwater Cleanup Levels (IGCLs). This supports that the capped cresosote waste in the landfill and lagoon areas, is not leaching to groundwater. In addition, groundwater samples have been collected and analyzed annually over the last five years to determine if groundwater concentrations above IGCLs are still contained within the TI zone boundaries and to evaluate the stability of the Site's groundwater plume. Attachment D, provides the results of the annual groundwater sampling from 2014 through 2018. The results of the sampling support that all COCs in groundwater are below IGCLs. This demonstrates that the TI boundary in groundwater remains consistent and is within the TI area , as documented in the 2013 ESD.

Sediment

On behalf of the PRP, their contractor conducted sediment sampling on the shore of Hocomonco Pond in June 2018, as part of the Long Term Monitoring Plan (LTMP) for the Site. Figure 2 depcits the sediment sampling locations. At two of the four locations, sampling was first conducted in December of 1998. At these same two locations, and in accordance with the LTMP, sampling was performed of 2000, the spring and fall from 2001 to 2004, and concluded in the spring of 2005. In 2009, EPA requested that the annual sampling of sediment be continued to support the 2009, Five Year Review for the Site. As part of this sampling the PRP and EPA agreed to collect sediment from two additional stations, commencing with the annual sediment sampling 2009. In 2014, the LTMP was revised to incorporate various changes that had been requested since the original 2001 LTMP was put into place. Based on the 2014 LTMP, sediment samples were collected from locations SED-1, SED-1A, SED-2, and SED-2A. Results of the various long term sediment sampling programs span from 1998 to 2018.

Sediment concentrations of total PAH and phenanthrene appear to exhibit an overall increase in concentrations starting in 2012, with the Mann-Kendall test but not with the regression analysis of Sen's Estimator of slope test, at locations SED-1 and SED-1A. However, this may be attributable to a change in sampling equipment that occurred between 2010 and 2012. The sampling equipment was changed to increase retention of fines, which are the fraction of sediment most likely to contain PAH and Total Organic Content (TOC). PAH and TOC concentrations often co-vary at this Site, and the TOC concentrations also showed a general increase after 2012.

For purposes of this five-year review, the evaluation of protectiveness for ecological receptors focused on trends since 2012, to account for the change in sampling methods at that time. For the next Five-Year Review, it is expected that the sampling methodology will not change, and the PAH concentrations should remain stable or decrease. Given the results observed over the past 22 years and based on the decision tree in the 2014 LTMP, the remedy is protective of human health and the environment.

Site Inspection

The inspection of the Site was conducted on August 22, 2019. In attendance were Derrick Golden, EPA Remedial Project Manager, Mike Bollinger, Environmental Manager for the PRP (Beazer), Rob Anderson, consultant for the PRP, and Paul Anderson, consultant for the PRP.

The purpose of the inspection was to assess the protectiveness of the remedy. Specifically, the Landfill and Former Lagoon areas were visually inspected and there were no signs of animal burrows, erosion or structures, and drainage swales appeared to be functioning and the grass on both areas was recently mowed. Except for the Landfill and Former Lagoon areas, the site is heavily vegetated and is surrounded by a chain link fence on three sides and by Hocomonco Pond. There were no sign of trespassing or vandalism at the Site.

No issues that could impact the protectiveness of the remedy were noted.

V. TECHNICAL ASSESSMENT

QUESTION A: Is the remedy functioning as intended by the decision documents?

Yes, the remedy components are functioning as intended by the 1985 ROD, and as amended by the three ESDs (1992, 1997 and 2013) The remedy included mechanical excavation of contaminated soil and sediments and placing them into the Former Lagoon or Landfill areas; and capping those areas. In addition, the Otis street open jointed storm drain, that went through the corner of the former lagoon, was relocated to prevent cresosote wastes from entering Hocomonco Pond. Annual sampling of pond sediment and groundwater continues, along with passive DNAPL recovery.

Remedial Action Performance

Review of the quarterly status reports, 2018 groundwater and sediment sampling results indicate that the remedy components are functioning as intended by the 1985 ROD and by the three ESDs (1992, 1997 and 2013).

The other components of the remedy (the ICs, passive DNAPL recovery, Former Lagoon and Landfill covers), are functioning as intended.

System Operations/O&M

Current operating procedures, as implemented, are working in a manner that will continue to maintain the effectiveness of the remedy. The RP are responsible for the O&M at the Site and will be getting cost proposals to dismantle and properly dispose of groundwater treatment equipment.

Implementation of Institutional Controls and Other Measures

ICs were placed on the property on November 27, 2017, in the form of a Notice of Activity and Use Limitation (NAUL). The ICs were recorded on the deed for the property. The ICs are intended to prevent exposure by restricting certain land uses and restrict groundwater use at the Site.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

No. There have been changes in exposure assumptions, risk assessment methods, and toxicity values since the time of remedy selection; however, the RAOs as modified by the 1992, 1997 and 2013 ESDs, are still valid. The changes as described below are not expected to impact the protectiveness of the remedy because the cover over the former lagoon and landfill is intact, public drinking water is provided to the area, and groundwater use is prevented by Institutional Controls in the form of a Notice of Activity and Use Limitation. The human health risks of fish ingestion and surface water exposure, which were acceptable at the time of the ROD before remediation, have not been quantified recently but are likely to have decreased even further because the remedy removed the source material (cresosote) from the pond and the area continues to be inaccessible due to fencing.

Additional toxicity values for freshwater sediments have been developed for PAHs since the time of remedy selection, however the protectiveness of the remedy for this Site is based on ensuring that the long-term trend in PAH concentrations decrease or remain constant within the TI zone. Statistical analysis of sediment data over time indicates that this condition is met.

Question B Summary:

The toxicity values and risk assessment approach for some PAHs have changed but these changes do not affect the protectiveness of the remedy because the remedy is based on compliance with groundwater cleanup levels in sentinel wells at the boundary of the TI waiver zone, rather than risk. The latest sediment sampling indicates that the detected concentrations are lower than sediment RSLs calculated for a conservative recreational exposure scenario. The current concentrations of PAHs in groundwater do not exceed EPA's risk limits based on comparison of concentrations with tapwater EPA Regional Screening Levels (RSLs). The Site is protective for potential vapor intrusion so long as the current groundwater treatment building is not occupied more than intermittently, and new construction is prevented unless vapor intrusion potential is evaluated before construction or pre-construction vapor mitigation measures are installed.

Changes in Standards and TBCs

Since the 1985 ROD was a pre-SARA decision, no detailed listing or analysis of applicable or relevant and appropriate requirements was included. However, as mentioned in the previous FYR, the interim cleanup goals for ethylbenzene, toluene, xylenes (total), and chromium (total) are now final MCLs for each compound. Site-specific risk-based cleanup goals established in the SDD, along with MCLs provide the protectiveness necessary at the Site so long as the Site contaminants are retained within the TI waiver zone, as demonstrated by long term monitoring and sentinel wells.

Changes in Toxicity and Other Contaminant Characteristics

- 2016 PFOA/PFOS non-cancer toxicity values

In May 2016, EPA issued final lifetime drinking water health advisories for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), which identified a chronic oral reference dose (RfD) of 2E-05 mg/kg-day for PFOA and PFOS (USEPA, 2016a and USEPA, 2016b). These RfD values should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFOA and PFOS might be present based on site history. Potential estimated health risks from PFOA and PFOS, if identified, would likely increase total site risks due to groundwater exposure.

Sampling for PFOA/PFOS in groundwater at the Site is not recommended because these chemicals are not associated with wood treatment facilities (i.e., the use of creosote). In addition, there is no historical information of a fire or the use of firefighting foam at the Site. In addition, due to the presence of DNAPL, groundwater cleanup levels were waived through the issuance of the 1997 TI Waiver approval via the 1997 ESD.

The potential presence of PFAS does not affect the protectiveness of the remedy because there is no groundwater exposure.

- 2014 PFBS non-cancer toxicity value

Perfluorobutanesulfonic acid (PFBS) has a chronic oral RfD of 2E-02 mg/kg-day based on an EPA Provisional Peer Reviewed Toxicity Value (PPRTV) (USEPA, 2014a). This RfD value should be used when evaluating potential risks from ingestion of contaminated groundwater at Superfund sites where PFBS might be present based on site history. Potential estimated health risks from PFBS, if identified, would likely increase total site risks due to groundwater exposure. Further evaluation of potential risks from exposure to PFBS in other media at the Site might be needed based on site conditions and may also affect total site risks.

- Lead in Soil

The approach for lead in soil cleanup changed in 2016 (2016 OLEM memorandum "Updated Scientific Considerations for Lead in Soil Cleanups" (OLEM Directive 9200.2-167;) and 2017 (2017 OLEM memorandum "Transmittal of Update to the Adult Lead Methodology's Default Baseline Blood Lead Concentration and Geometric Standard Deviation Parameters" (OLEM Directive 9285.6-56). These changes support site-specific lead soil screening levels (SLs) of 200 ppm and 1,000 ppm for residential and commercial/industrial exposures, respectively.

The ROD did not identify lead as a chemical of concern in soil in the ROD, and the maximum pre-remedial soil lead concentrations were 5.2 mg/kg in the former lagoon area, 14 mg/kg in the kettle pond area and 19 mg/kg in pond sediment; therefore, the changed approach to blood lead modeling does not affect the protectiveness of the remedy.

- 2017 Polycyclic Aromatic Hydrocarbons (PAHs) cancer and non-cancer toxicity values

On January 19, 2017, EPA issued revised (less carcinogenic) cancer toxicity values and new non-cancer toxicity values for benzo(a)pyrene. Benzo(a)pyrene did not have non-cancer toxicity values

prior to January 19, 2017. Benzo(a)pyrene is now considered to be carcinogenic by a mutagenic mode of action; therefore, cancer risks must be evaluated for different human developmental stages using age dependent potency adjustment factors (ADAFs) for different age groups. The cancer potency of other carcinogenic PAHs is adjusted by the use of relative potency factors (RPFs), which are expressed relative to the potency of benzo(a)pyrene. The non-cancer effects of benzo(a)pyrene were not evaluated in the past due to the absence of non-cancer values.

Although the original and revised groundwater cleanup levels are not applicable due to the TI waiver, the most recent (November, 2018) groundwater concentrations of benzene, toluene, ethylbenzene, xylenes and 18 individual PAHs in 14 monitoring wells were compared with April, 2019 EPA Regional Screening Levels (RSLs) for tapwater (set at cancer risk = 1E-06 or Hazard Quotient = 1) to evaluate the potential risk of groundwater ingestion were it to occur. As shown in Table 1 (attached), the RSLs for four carcinogenic PAHs (benzo(a)pyrene, benz(a)anthracene, benzo(a)fluoranthene, dibenz(a,h)anthracene) were exceeded in one well (MLC-5S), and the RSL for naphthalene was exceeded in two wells (LF-3, LF-4). The non-cancer risks were less than EPA's Hazard Quotient limit of 1, and the cancer risks were within EPA's acceptable risk range HQ =1 of 1E-06 to 1E-04.

The recent June 2018, sediment monitoring data for the four sediment locations were compared with sediment recreational screening levels set at an HQ = 1 and a cancer risk of 1×10^{-6}. These sediment RSLs were calculated using the EPA RSL calculator (https://epa-prgs.ornl.gov/cgi-bin/chemicals/csl_search) and an assumed exposure of 8 days per year for one hour per day by a child or adult recreator. This recreational exposure is highly conservative because the pond is not readily accessible due to fencing. The results indicate that the detected concentrations of PAHs in sediment were lower than recreational sediment RSLs, indicating that the potential human health risks of sediment contact are lower than EPA maximum risk limits (HQ = 1 cancer risk less than 1×10^{-4}).

Changes in Risk Assessment Methodology

- 2014 OSWER Directive Determining Groundwater Exposure Point Concentrations, Supplemental Guidance

  In 2014, EPA finalized a Directive to determine groundwater exposure point concentrations (EPCs) https://cfpub.epa.gov/ncea/risk/recordisplay.cfm?deid=236917.
  This Directive provides recommendations to develop groundwater EPCs. The recommendations to calculate the 95% UCL of the arithmetic mean concentration for each contaminant from wells within the core/center of the plume, using the statistical software ProUCL, could result in lower groundwater EPCs than the maximum concentrations routinely used for EPCs as past practice in risk assessment, leading to changes in groundwater risk screening and evaluation. In general, this approach could result in slightly lower risk or higher screening levels. (Reference: USEPA. 2014. Determining Groundwater Exposure Point Concentrations. OSWER Directive 9283.1-42. February 2014.). This guidance does not affect the protectiveness of the remedy because the remedy does not rely on developing EPCs in the center of the groundwater plume, rather, the protectiveness of the remedy is based on compliance with groundwater cleanup levels in specific sentinel wells at the TI waiver boundary.

- 2014 OSWER Directive on the Update of Standard Default Exposure

In 2014, EPA finalized a Directive to update standard default exposure factors and frequently asked questions associated with these updates. https://www.epa.gov/sites/production/files/2015-11/documents/oswer_directive_9200.1-120_exposurefactors_corrected2.pdf). Many of these exposure factors differ from those used in the risk assessment(s) supporting the ROD. These changes in general would result in a slight decrease of the risk estimates for most chemicals. (Reference: USEPA. 2014. Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120. February 6, 2014.)

- 2018 EPA VISL Calculator

In February 2018, EPA launched an online Vapor Intrusion Screening Level (VISL) calculator which can be used to obtain risk-based screening level concentrations for groundwater, sub-slab soil gas, and indoor air. The VISL calculator uses the same database as the Regional Screening Levels for toxicity values and physiochemical parameters and is automatically updated during the semi-annual RSL updates. Please see the User's Guide for further details on how to use the VISL calculator. https://www.epa.gov/vaporintrusion/vapor-intrusion-screening-level-calculator.

One pathway of potential concern that was not evaluated in the previous risk assessments was the future vapor intrusion pathway. This pathway may be of concern at sites where soil and shallow groundwater contaminated with VOCs exists in close proximity to occupied buildings. Except for the groundwater treatment plant building, there are no buildings located above the groundwater plume that could contain concentrations of VOCs above vapor intrusion screening levels. The treatment building is only occasionally occupied for short periods of time. However, should shallow groundwater VOC contamination continue to exist coincident with future Site development involving regular use of the treatment building or the construction of new buildings that will be occupied consistently (e.g., office space), the vapor intrusion pathway should be further evaluated to determine if there is potential risk to on-Site workers. Alternatively, vapor intrusion could be prevented by use of institutional controls and/or preconstruction installation of mitigation engineering controls.

Expected Progress Towards Meeting RAOs

The remedy is progressing as expected towards meeting RAOs because DNAPL removal is continuing as planned, groundwater monitoring demonstrates compliance with the groundwater RAOs at the current TI zone compliance boundary. There are no new known site conditions that impact RAOs and remedy protectiveness

Sediment concentrations of total PAH and phenanthrene appear to exhibit an overall increase in concentrations starting in 2012, however this might be attributable to a change in sampling equipment that occurred in this time frame. PAH and TOC concentrations often co-vary at this site, and TOC concentrations also showed a general increase after 2012. For purposes of this five-year review, the evaluation of protectiveness for ecological receptors focused on trends since 2012 to account for the change in sampling methods at that time. For the next five-year review, it would be expected that PAH concentrations would remain stable or decrease within the TI zone.

QUESTION C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues and Recommendations Identified in the Five-Year Review:

OU(s): **Sitewide**	**Issue Category: Monitoring**			
	Issue: Bulk sediment concentrations intermittently exceed ecological cleanup goals.			
	Recommendation: Continue annual monitoring. If sample results continue to exceed cleanup levels, and a steadily increasing trend in concentrations becomes apparent, determine appropriate action(s) to address, in order to ensure protectiveness.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/30/2024

OTHER FINDINGS

- EPA and MassDEP will work with the PRP and the town to dismantle and properly dispose of the former groundwater treatment equipment and footprint, so that the town can utilize the empty building. Note that as part of the towns' settlement with the PRP, the town owns the property.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)		
Operable Unit: **Sitewide**	*Protectiveness Determination:* Short-term Protective	*Planned Addendum Completion Date:* N/A
Protectiveness Statement: The remedy currently protects human health and the environment because physical access to the Site is restricted and there are no potable wells, and ICs are in place. However, in order for the remedy to be protective in the long-term, monitoring of sediment and groundwater should continue, to determine if increasing trends are present and assess appropriate actions to respond, to ensure long-term protectiveness		

VIII. NEXT REVIEW

The next five-year review report for the Hocomonco Pond Superfund Site is required five years from the completion date of this review, in September of 2024.

REFERENCE LIST

- Record of Decision – September 1985
- Supplemental Decision Document Supplemental Decision Document entitled: *Cleanup Levels for Sediments, Soils and Groundwater and Limits of Excavation of Sediments and Soils* – September, 1992
- First ESD = 1999
- Second ESD – 1999
- Third ESD - Extend the TI zone boundary and modify the DNAPL recovery method – September 2013
- Hocomonco Pond Operation & Maintenance Manual – August 2014
- Five Year Review – September 2014
- Institutional Controls - 2017
- 4th Quarter Site Status Report – Hocomonco Pond – For October 2018 thru December 2018 (note that this Status Report also includes 2018 Sediment and Groundwater Sampling Results)
- 1st Quarter Site Status Report – Hocomonco Pond –For January 2019 thru March 2019
- 2nd Quarter Site Status Report – Hocomonco Pond – For April 2019 thru June 2019

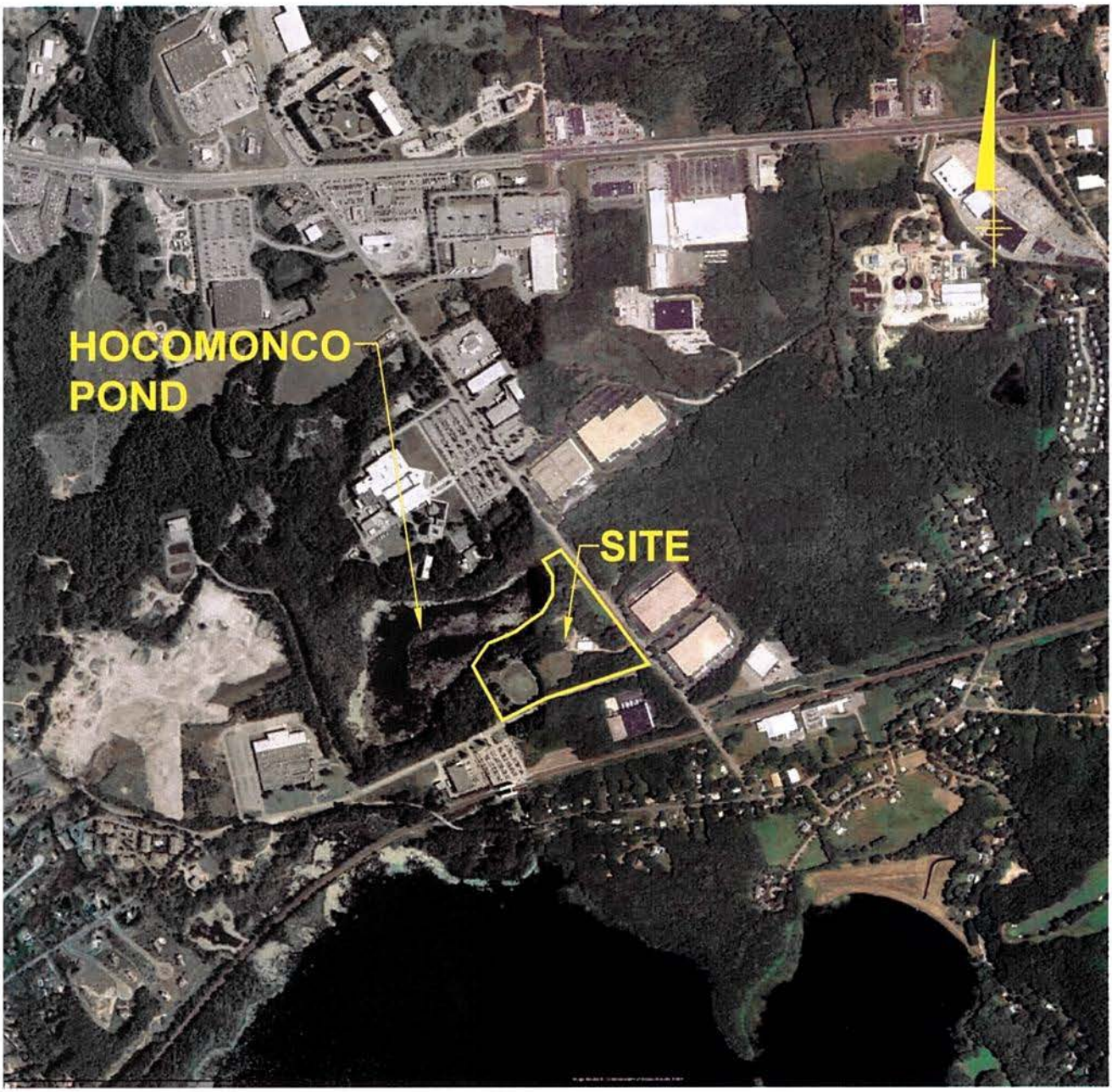
FIGURES

Figure 1 – Site location
Figure 2 – Site Map with TI Zone Areas
Figure 3 – Site Map with monitoring well Locations

APPENDICES

Appendix A – 2017 Zoning map -Town of Westborough
Appendix B – DNAPL Recovery Tables
Appendix C – Interview Forms
Appendix D – Groundwater Summary Tables

FIGURES 1-3



0 1200' 2400'

GRAPHIC SCALE

NOTE:

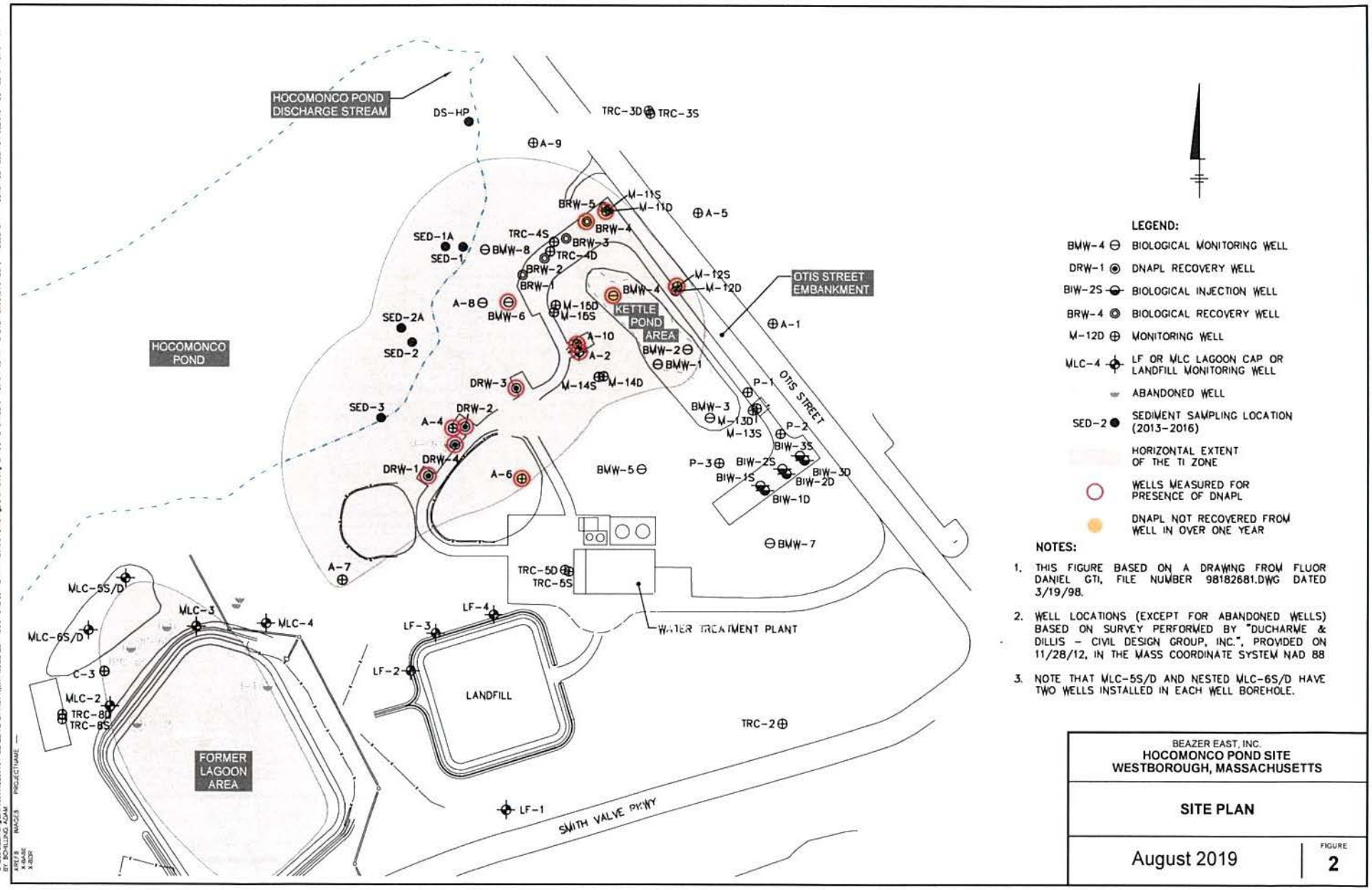
1. AERIAL IMAGE FROM GOOGLE EARTH PRO.

BEAZER EAST, INC
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

SITE LOCATION MAP

August 2019

FIGURE
1



LEGEND:

- BMW-4 ⊖ BIOLOGICAL MONITORING WELL
- DRW-1 ◉ DNAPL RECOVERY WELL
- BIW-2S ⊖ BIOLOGICAL INJECTION WELL
- BRW-4 ◎ BIOLOGICAL RECOVERY WELL
- M-12D ⊕ MONITORING WELL
- MLC-4 LF OR MLC LAGOON CAP OR LANDFILL MONITORING WELL
- ABANDONED WELL
- SED-2 ● SEDIMENT SAMPLING LOCATION (2013-2016)
- HORIZONTAL EXTENT OF THE TI ZONE
- WELLS MEASURED FOR PRESENCE OF DNAPL
- DNAPL NOT RECOVERED FROM WELL IN OVER ONE YEAR

NOTES:

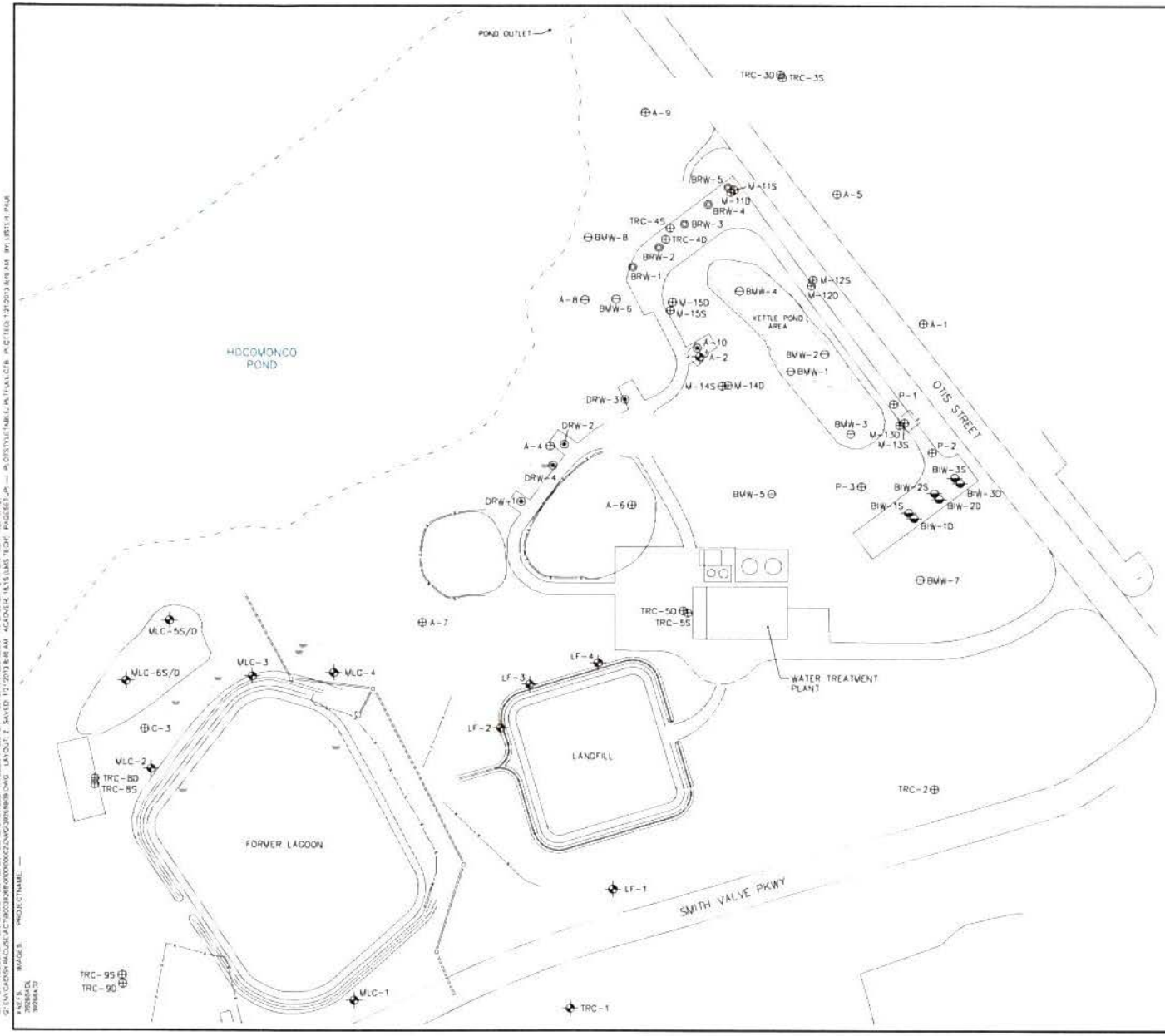
1. THIS FIGURE BASED ON A DRAWING FROM FLUOR DANIEL GTI, FILE NUMBER 98182681.DWG DATED 3/19/98.
2. WELL LOCATIONS (EXCEPT FOR ABANDONED WELLS) BASED ON SURVEY PERFORMED BY "DUCHARME & DILLIS - CIVIL DESIGN GROUP, INC.", PROVIDED ON 11/28/12, IN THE MASS COORDINATE SYSTEM NAD 88
3. NOTE THAT MLC-5S/D AND NESTED MLC-6S/D HAVE TWO WELLS INSTALLED IN EACH WELL BOREHOLE.

BEAZER EAST, INC.
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

SITE PLAN

August 2019

FIGURE **2**



LEGEND:

- BMW-4 ⊖ BIOLOGICAL MONITORING WELL
- DRW-1 ◉ DNAPL RECOVERY WELL
- BIW-2S ⊖ BIOLOGICAL INJECTION WELL
- BRW-4 ◎ BIOLOGICAL RECOVERY WELL
- M-12D ⊕ MONITORING WELL
- MLC-4 ✦ LF OR MLC LAGOON CAP OR LANDFILL MONITORING WELL
- – ABANDONED WELL

NOTES:

1. THIS FIGURE BASED ON A DRAWING FROM FLUOR DANIEL GTI, FILE NUMBER 98182681.DWG DATED 3/19/98. ALL LOCATIONS ARE APPROXIMATE.
2. WELL LOCATIONS (EXCEPT FOR ABANDONED WELLS) BASED ON SURVEY PERFORMED BY "DUCHARME & DILLIS – CIVIL DESIGN GROUP, INC.", PROVIDED ON 11/28/12, IN THE MASS COORDINATE SYSTEM NAD 88
3. NOTE THAT MLC-5S/D AND MLC-6S/D ARE NESTED AND HAVE TWO WELLS INSTALLED IN EACH WELL BOREHOLE

0 60' 120'
GRAPHIC SCALE

BEAZER EAST, INC
HOCOMONCO POND SITE
WESTBOROUGH, MASSACHUSETTS

SITE PLAN/MONITORING WELL LOCATIONS

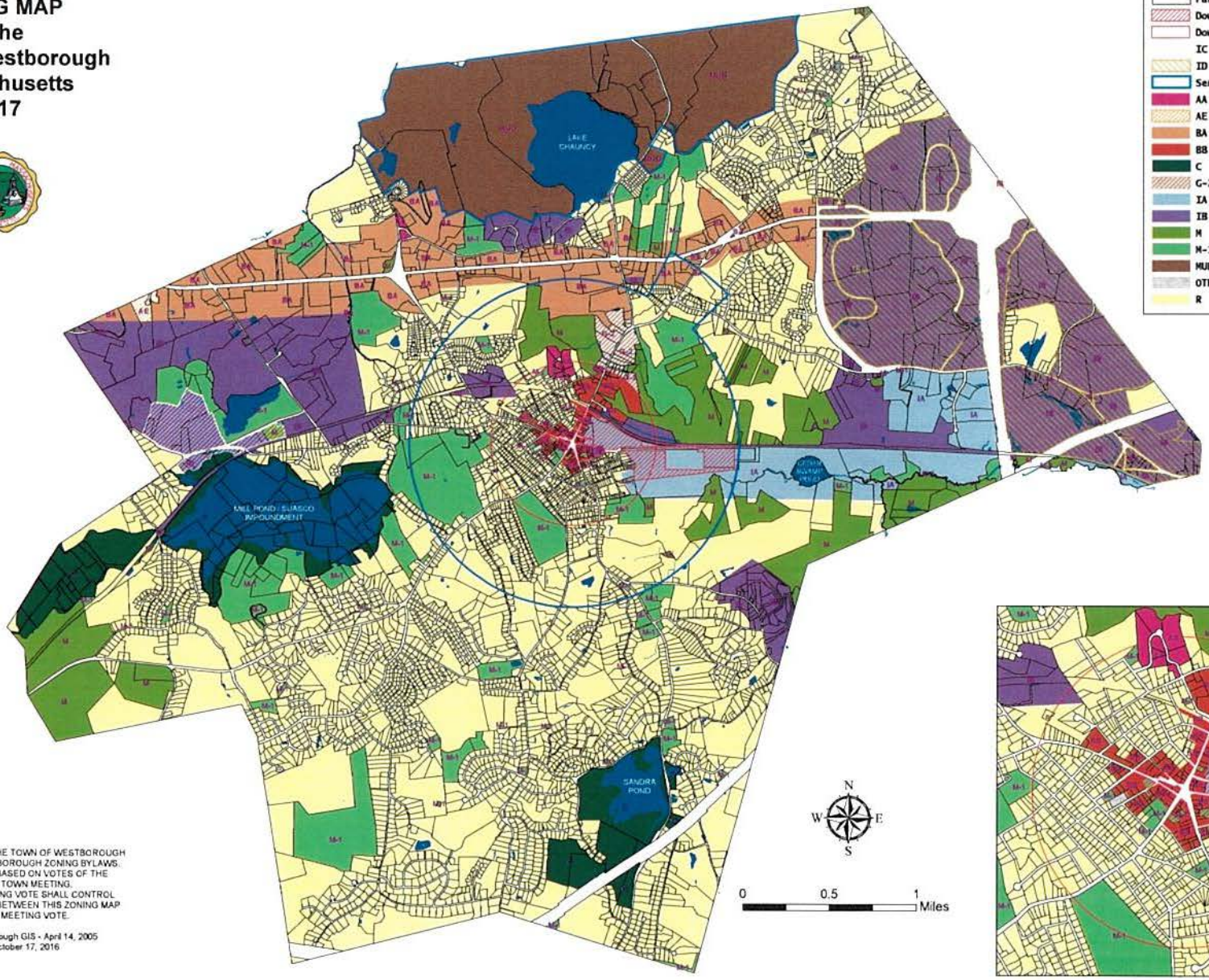
August 2019

FIGURE
3

APPENDICES

APPENDIX A

ZONING MAP
of the
Town of Westborough
Massachusetts
2017



		Parcels
		Downtown Planning Overlay
		Downtown Business District
		IC Overlay District
		ID Overlay District
		Senior Living Overlay
AA		Apartment, Garden
AE		Adult Entertainment
BA		Business, Highway
BB		Business, Downtown
C		Conservation
G-2		Gateway 2
IA		Industrial A
IB		Industrial B
M		State Owned
M-1		Town Owned
MUD		Mixed Use District
OTH		All other Zones
R		Residential, Single

OFFICIAL ZONING MAP OF THE TOWN OF WESTBOROUGH
UNDER 2120 OF THE WESTBOROUGH ZONING BYLAWS.
THIS MAP IS COMPILED BASED ON VOTES OF THE
WESTBOROUGH TOWN MEETING.
THE ACTUAL TOWN MEETING VOTE SHALL CONTROL
AS TO ANY DISCREPENCY BETWEEN THIS ZONING MAP
AND THE TOWN MEETING VOTE.

Map created by Westborough GIS - April 14, 2005
Map revised October 17, 2016

APPENDIX B

DNAPL Removal Summary - Q1 2014 through Q2 2019
2019 Five Year Review
Hocomonco Pond Site
Westborough, Massachusetts

Well ID	DNAPL Removed (gallons)											
	Q1 2014	Q2 2014	Q3 2014	Q4 2014	Q1 2015	Q2 2015	Q3 2015	Q4 2015	Q1 2016	Q2 2016	Q3 2016	Q4 2016
DRW-1	26.0	30.5	26.8	23.0	26.0	33.5	25.0	21.0	30.0	21.5	27.0	12.0
DRW-2	71.4	73.4	37.3	39.9	33.0	67.0	55.0	74.5	56.0	59.0	43.0	58.0
DRW-3	9.8	4.0	10.0	18.2	10.5	5.5	6.0	5.0	0.0	5.0	9.0	2.0
DRW-4	5.5	21.0	18.0	15.9	10.5	32.5	12.0	13.0	14.0	27.0	13.0	18.0
A-2	17.5	17.0	13.5	16.0	10.5	19.4	21.0	20.0	26.0	20.0	19.0	14.5
A-4	41.5	29.9	17.8	16.6	15.0	33.8	16.0	16.5	19.0	32.0	25.0	27.0
A-6	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
A-10	2.0	0.0	0.0	3.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BMW-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BMW-6	2.0	0.8	2.0	1.5	0.5	0.3	0.5	1.0	4.5	2.0	1.0	0.5
BRW-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BRW-5	2.5	2.5	2.5	1.3	2.5	3.0	7.5	3.0	4.3	2.5	0.0	3.0
M-11D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M-12S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals:	**178.9**	**179.0**	**127.8**	**136.0**	**108.5**	**194.9**	**143.0**	**154.0**	**153.8**	**169.0**	**137.0**	**135.0**

Well ID	DNAPL Removed (gallons)										Avg Monthly Removal (gallons)	Total Removal (Q1 2014 - Q2 2019) (gallons)
	Q1 2017	Q2 2017	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018	Q1 2019	Q2 2019		
DRW-1	30.0	17.0	20.0	14.0	38.0	23.0	17.0	10.0	23.0	17.0	7.7	511.3
DRW-2	45.5	35.0	38.0	42.0	57.0	54.0	44.5	38.0	46.0	37.0	16.7	1104.4
DRW-3	2.5	2.0	4.3	0.0	0.0	11.0	5.0	3.5	4.0	3.0	1.8	120.2
DRW-4	16.5	9.0	19.5	12.3	29.0	18.5	13.0	9.0	19.0	9.5	5.4	355.6
A-2	24.0	27.5	27.0	24.5	27.0	26.0	26.5	20.5	12.0	15.0	6.7	444.4
A-4	17.0	16.0	22.0	13.0	30.8	18.0	17.0	15.0	44.0	16.0	7.6	498.7
A-6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8
A-10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	5.8
BMW-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BMW-6	0.5	0.5	1.0	1.0	0.5	3.0	2.5	2.0	1.0	1.0	0.4	29.5
BRW-4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BRW-5	2.0	2.0	0.0	2.5	6.0	4.5	3.5	2.5	2.0	5.8	1.0	65.3
M-11D	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
M-12S	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Totals:	**138.0**	**109.0**	**131.8**	**109.3**	**188.3**	**158.0**	**129.0**	**100.5**	**151.0**	**104.3**	**47.5**	**3135.7**

Notes:
Avg - Average.

APPENDIX C

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)	**EPA ID No.:** MAD980732341	
Subject: Five Year Review	**Time:**	**Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**	☐ Incoming	☐ Outgoing

Contact Made By:

Name:	**Title:**	**Organization:**

Individual Contacted:

Name: Derek Saari	**Title:** Conservation Director	**Organization:** Town of Westborough
Telephone No: 508-366-3014 **E-Mail:** dsaari@town.westborough.ma.us	**Street Address:** 34 W Main Street Westborough, MA 01581	

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**
   I have communicated earlier this year with Michael Bollinger, Environmental Manager for Beazer east, Inc. regarding the schedule for decommissioning. It does seem that the decommissioning schedule has not started which is significantly off from the timeline originally presented.

2. **Are you aware of any community concerns or effects that site operations and administration have on the surrounding community?**
   The Town would like to have a better understanding of the decommissioning schedule so that the Hocomonco Pond Reuse Committee can be more effective in its duties of establishing proper reuse activities on the site including using the existing building for storage.

3. **Do you feel well informed about site activities and progress?**
   I do have the decommissioning work plan and the recorded Activity and Use Limitation document and associated recorded plan. However, communication has been weak regarding the schedules for completion.

4. **Have there been any planned changes that you know of in projected land use/zoning at or near the site?**
   No, but it should be noted that the Town is just starting the process of updating the Town's Master Plan.

5. Have any interested parties approached your office about the site's future reuse (if different from current uses)? If so, what is the schedule for future development?
Yes, our local Reuse Committee as previously mentioned. However, I have indicated to them to not put a lot of effort until the decommissioning has commenced.

6. Have any problems been encountered or changes in the site conditions that affect the current institutional controls at the site?
No

7. Have there been any complaints, violations, or other incidents such as vandalism, trespassing, or emergency responses related to the site requiring a response by your office? If so, please give details of the events and results of the response.
No

8. Do you have any comments, suggestions, or recommendations regarding site management, or operation?
I have asked in the past regarding future uses within the actual Pond. Nowhere in the AUL is the Pond mentioned. It would be helpful to have a direct response from the EPA on allowed/prohibitive uses. In addition, who is maintaining the fencing or can it come down, who is maintaining the lagoons post-decommissioning, etc.

9. Is there any other information that you wish to share that might be of use?
Our Director of Grounds and Facilities would like to see inside the building prior to decommissioning. This request has been asked many times and still has not occurred.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)		**EPA ID No.:** MAD980732341
Subject: Five Year Review		**Time:** **Date:**
Type: ☐ Telephone ☐ Visit ☐ Other **Location of Visit:**		☐ Incoming ☐ Outgoing
Contact Made By:		
Name:	**Title:**	**Organization:**
Individual Contacted:		
Name: Mike Bollinger	**Title:** Project Manager	**Organization:** Beazer East, Inc.
Telephone No: 412-208-8864 **E-Mail:** mike.bollinger@trmi.biz	**Street Address:** 600 River Avenue, Suite 200 Pittsburg, PA 15212	

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results. FTS, the OM&M contractor for Beazer East, Inc. makes site visits on a scheduled basis to perform inspections and OM&M activities in accordance with the requirements of the site OM&M manual.**
2. **Are you aware of any community concerns or effects that site operations and administration have on the surrounding community? No.**
3. **Do you feel well informed about site activities and progress? Yes.**
4. **Have there been any planned changes that you know of in projected land use/zoning at or near the site? Not that I am aware.**
5. **Have any interested parties approached your office about the site's future reuse (if different from current uses)? If so, what is the schedule for future development? I am not aware of any specific time frame.**

6.	Have any problems been encountered or changes in the site conditions that affect the current institutional controls at the site? No.
7.	Have there been any complaints, violations, or other incidents such as vandalism, trespassing, or emergency responses related to the site requiring a response by your office? If so, please give details of the events and results of the response. No.
8.	Do you have any comments, suggestions, or recommendations regarding site management, or operation? Beazer will continue to work with EPA to identify and implement, as appropriate, optimization opportunities related to site operations and monitoring while maintaining the ongoing protectiveness of the site remedies.
9.	Is there any other information that you wish to share that might be of use? Not at this time.

INTERVIEW RECORD

Site Name: Hocomonco Pond Superfund Site (Westborough, MA)		**EPA ID No.:** MAD980732341
Subject: Five Year Review	**Time:** 1:30 PM	**Date: 8/6/19**
Type: ☐ Telephone ☐ Visit x☐ Other **Location of Visit:**	☐ Incoming	☐ Outgoing

Contact Made By:

Name:	**Title:**	**Organization:**

Individual Contacted:

Name: Paul Craffey	**Title:** Project Manager	**Organization:** MassDEP
Telephone No: 617-292-5591 **E-Mail:** paul.craffey@state.ma.us	**Street Address:** One Winter Street Boston, MA 02108	

1. **Have there been routine communications or activities (site visits, inspections, reporting activities, etc.) conducted by your office regarding the site? If so, please give purpose and results.**
   MassDEP has received and reviewed routine reports (quarterly) and other correspondence related to site activities (plant building shut down).
   MassDEP has not conducted any site inspections.

2. **Are you aware of any community concerns or effects that site operations and administration have on the surrounding community?**
   Not aware of any.

3. **Do you feel well informed about site activities and progress?**
   Yes, the PRP group has continued to keep the MassDEP informed of site activities and monitoring results.

4. **Have there been any planned changes that you know of in projected land use/zoning at or near the site?**
   None to date.

5. **Have any interested parties approached your office about the site's future reuse (if different from current uses)? If so, what is the schedule for future development?**
   The Town of Westborough seems to have an interest in the property.

6. Have any problems been encountered or changes in the site conditions that affect the current institutional controls at the site? Not that I am aware of.
7. Have there been any complaints, violations, or other incidents such as vandalism, trespassing, or emergency responses related to the site requiring a response by your office? If so, please give details of the events and results of the response. None reported.
8. Do you have any comments, suggestions, or recommendations regarding site management, or operation? Not at this time.
9. Is there any other information that you wish to share that might be of use? The PRP group has done a good job in keeping the MassDEP informed of site activities.

APPENDIX D

Groundwater Analytical Results
From 2014 through 2018
2019 Five Year Review
Hocomonco Pond Site
Westborough, Massachusetts

Well ID: / Sample Date:	Groundwater Cleanup Levels	MLC-1 11/11/2014	MLC-1 11/9/2015	MLC-1 11/8/2016	MLC-1 11/7/2017	MLC-1 11/6/2018	MLC-4 11/10/2014	MLC-4 11/9/2015	MLC-4 11/8/2016	MLC-4 11/7/2017	MLC-4 11/7/2018	MLC-5S 11/10/2014	MLC-5S 11/9/2015	MLC-5S 11/8/2016
VOCs:														
Benzene	5	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U	0.9 J	0.67	5.0 U	1.0 U
Toluene	1,000	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	0.49 J	1.0 U	5.0 U	1.0 U
Ethylbenzene	700	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.2	1.0 U	5.0 U	1.0 U
Xylene (Total)	10,000	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.6 J	1.0 U	5.0 U	1.0 U
SVOCs:														
Acenaphthene	2,200	0.027	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.32	0.081	0.060 J	0.10 U
Acenaphthylene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.092 J	0.10 U	0.20 U	0.0705 J
Anthracene	11,000	0.11 U	0.20 U	0.0518 J	0.18 U	0.049 J	0.10 U	0.20 U	0.0435 J	0.18 U	0.18 U	0.40	0.20 U	0.412
Benzo(a)anthracene	-	0.056 U	0.20 U	0.11 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U	0.18 U	0.052 U	0.20 U	0.0892 J
Benzo(a)pyrene	0.2	0.11 U	0.20 U	0.11 U	0.18 U	0.055 J	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U
Benzo(b)fluoranthene	-	0.056 U	0.20 U	0.11 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U	0.18 U	0.061	0.20 U	0.0721 J
Benzo(g,h,i)perylene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.044	0.20 U	0.10 U
Benzo(k)fluoranthene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.079	0.20 U	0.0697 J
Chrysene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.0477 J
Dibenzo(a,h)anthracene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.050	0.20 U	0.0586 J
Fluoranthene	1,500	0.11 U	0.16 J	0.11 U	0.18 U	0.10 J	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.017	0.20 U	0.319
Fluorene	1,500	0.040	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.26	0.024	0.20 U	0.10 U
Indeno(1,2,3-cd)pyrene	-	0.11 U	0.20 U	0.11 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.038	0.20 U	0.10 U
1-Methylnaphthalene		NA	NA	NA	NA	0.18 U	NA	NA	NA	0.093 J	0.73	NA	NA	NA
2-Methylnaphthalene	-	0.061	NA	0.11 U	0.18 U	0.18 U	2.1 U	NA	0.10 U	0.18 U	0.18 U	0.079	NA	0.10 U
Naphthalene	1,500	0.14	0.20 U	0.11 U	0.18 U	0.18 U	2.1 U	0.10 J	0.10 U	0.5	0.17 J	0.12	0.10 J	0.10 U
Phenanthrene	-	0.061	0.19 J	0.11 U	0.18 U	0.16 J	0.052 U	0.050 J	0.10 U	0.18 U	0.11 J	0.030	0.070 J	0.118
Pyrene	1,100	0.11 U	0.12 J	0.11 U	0.18 U	0.071 J	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.156

Groundwater Analytical Results
From 2014 through 2018
2019 Five Year Review
Hocomonco Pond Site
Westborough, Massachusetts

Well ID: / Sample Date:	Groundwater Cleanup Levels	MLC-5S 11/7/2017	MLC-5S 11/6/2018	MLC-5D 11/11/2014	MLC-5D 11/9/2015	MLC-5D 11/8/2016	MLC-5D 11/7/2017	MLC-5D 11/6/2018	MLC-6S 11/10/2014	MLC-6S 11/9/2015	MLC-6S 11/8/2016	MLC-6S 11/7/2017	MLC-6S 11/6/2018	MLC-6D 11/11/2014
VOCs:														
Benzene	5	0.67 J	0.61 J	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U
Toluene	1,000	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	700	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	10,000	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U
SVOCs:														
Acenaphthene	2,200	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.11 J	0.10 U	0.18 U	0.18 U	0.022
Acenaphthylene	-	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.0378 J	0.18 U	0.18 U	0.11 U
Anthracene	11,000	0.18 U	0.14 J	0.10 U	0.20 U	0.0394 J	0.18 U	0.18 U	0.043	0.20 U	0.481	0.098 J	0.11 J	0.11 U
Benzo(a)anthracene	-	0.18 U	0.18	0.051 U	0.20 U	0.10 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U	0.18 U	0.053 U
Benzo(a)pyrene	0.2	0.18 U	0.058 J	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
Benzo(b)fluoranthene	-	0.18 U	0.52	0.051 U	0.20 U	0.10 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U	0.18 U	0.053 U
Benzo(g,h,i)perylene	-	0.18 U	0.27	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
Benzo(k)fluoranthene	-	0.18 U	0.52	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
Chrysene	-	0.18 U	0.50	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
Dibenzo(a,h)anthracene	-	0.18 U	0.44	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
Fluoranthene	1,500	0.18 U	0.10 J	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.021	0.10 J	0.10 U	0.18 U	0.18 U	0.025
Fluorene	1,500	0.18 U	0.18 U	0.019	0.20 U	0.10 U	0.18 U	0.18 U	2.1 U	0.060 J	0.10 U	0.18 U	0.18 U	0.026
Indeno(1,2,3-cd)pyrene	-	0.18 U	0.40	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	2.1 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U
1-Methylnaphthalene		0.18 U	0.18 U	NA	NA	NA	0.18 U	0.18 U	NA	NA	NA	0.18 U	0.18 U	NA
2-Methylnaphthalene	-	0.18 U	0.18 U	0.043	NA	0.10 U	0.18 U	0.18 U	0.051	NA	0.10 U	0.18 U	0.18 U	0.026
Naphthalene	1,500	0.18 U	0.18 U	0.066	0.20 U	0.10 U	0.18 U	0.18 U	0.054	0.20 U	0.10 U	0.18 U	0.079 J	0.033
Phenanthrene	-	0.18 U	0.078 J	0.051 U	0.20 U	0.10 U	0.18 U	0.060 J	0.028	0.16 J	0.10 U	0.18 U	0.16 J	0.041
Pyrene	1,100	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.10 U	0.080 J	0.10 U	0.18 U	0.18 U	0.016

Groundwater Analytical Results
From 2014 through 2018
2019 Five Year Review
Hocomonco Pond Site
Westborough, Massachusetts

Well ID: / Sample Date:	Groundwater Cleanup Levels	MLC-6D 11/9/2015	MLC-6D 11/8/2016	MLC-6D 11/7/2017	MLC-6D 11/6/2018	LF-1 11/10/2014	LF-1 11/9/2015	LF-1 11/8/2016	LF-1 11/7/2017	LF-1 11/6/2018	LF-2 11/10/2014	LF-2 11/9/2015	LF-2 11/8/2016	LF-2 11/7/2017
VOCs:														
Benzene	5	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U
Toluene	1,000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Ethylbenzene	700	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
Xylene (Total)	10,000	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U
SVOCs:														
Acenaphthene	2,200	0.19 U	0.10 U	0.18 U	0.18 U	0.026	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Acenaphthylene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Anthracene	11,000	0.19 U	0.0425 J	0.18 U	0.18 U	0.10 U	0.090 J	0.10 U	0.19 U	0.18 U	0.019	0.20 U	0.157	0.18 U
Benzo(a)anthracene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.19 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U
Benzo(a)pyrene	0.2	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Benzo(b)fluoranthene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.052 U	0.20 U	0.10 U	0.19 U	0.18 U	0.052 U	0.20 U	0.10 U	0.18 U
Benzo(g,h,i)perylene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Benzo(k)fluoranthene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Chrysene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Dibenzo(a,h)anthracene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Fluoranthene	1,500	0.19 U	0.10 U	0.18 U	0.18 U	0.018	0.38	0.10 U	0.19 U	0.18 U	0.10 U	0.20	0.10 U	0.18 U
Fluorene	1,500	0.19 U	0.10 U	0.18 U	0.18 U	0.026	0.10 J	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
Indeno(1,2,3-cd)pyrene	-	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.20 U	0.10 U	0.19 U	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U
1-Methylnaphthalene		NA	NA	0.18 U	0.18 U	NA	NA	NA	0.19 U	0.18 U	NA	NA	NA	0.18 U
2-Methylnaphthalene	-	NA	0.10 U	0.18 U	0.18 U	0.079	NA	0.10 U	0.19 U	0.18 U	0.062	NA	0.10 U	0.18 U
Naphthalene	1,500	0.19 U	0.10 U	0.18 U	0.18 U	0.076	0.20 U	0.10 U	0.19 U	0.18 U	0.11	0.20 U	0.10 U	0.18 U
Phenanthrene	-	0.19 U	0.10 U	0.18 U	0.086 J	0.034	0.41	0.10 U	0.19 U	0.071 J	0.052 U	0.060 J	0.10 U	0.18 U
Pyrene	1,100	0.19 U	0.10 U	0.18 U	0.18 U	0.10 U	0.19 J	0.10 U	0.19 U	0.18 U	0.10 U	0.11 J	0.10 U	0.18 U

Groundwater Analytical Results
From 2014 through 2018
2019 Five Year Review
Hocomonco Pond Site
Westborough, Massachusetts

Well ID: / Sample Date:	Groundwater Cleanup Levels	LF-2 11/6/2018	LF-3 11/10/2014	LF-3 11/9/2015	LF-3 11/8/2016	LF-3 11/7/2017	LF-3 11/6/2018	LF-4 11/11/2014	LF-4 11/9/2015	LF-4 11/8/2016	LF-4 11/7/2017	LF-4 11/6/2018
VOCs:												
Benzene	5	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U	0.50 U	5.0 U	1.0 U	1.0 U	1.0 U
Toluene	1,000	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	700	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
Xylene (Total)	10,000	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5.0 U	1.0 U	1.0 U	1.0 U
SVOCs:												
Acenaphthene	2,200	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.17 J	0.032	0.19 U	0.10 U	0.18 U	0.096 J
Acenaphthylene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Anthracene	11,000	0.12 J	0.039	0.20 U	0.228	0.18 U	0.092 J	0.027	0.19 U	0.170	0.18 U	0.077 J
Benzo(a)anthracene	-	0.18 U	0.051 U	0.20 U	0.10 U	0.18 U	0.18 U	0.054 U	0.19 U	0.10 U	0.18 U	0.18 U
Benzo(a)pyrene	0.2	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Benzo(b)fluoranthene	-	0.18 U	0.051 U	0.20 U	0.10 U	0.18 U	0.18 U	0.054 U	0.19 U	0.10 U	0.18 U	0.18 U
Benzo(g,h,i)perylene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Benzo(k)fluoranthene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Chrysene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Dibenzo(a,h)anthracene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
Fluoranthene	1,500	0.15 J	0.10 U	0.14 J	0.10 U	0.18 U	0.073 J	0.11 U	0.17 J	0.10 U	0.18 U	0.34
Fluorene	1,500	0.12 J	0.018	0.20 U	0.10 U	0.18 U	0.29	0.11 U	0.19 U	0.10 U	0.18 U	0.16 J
Indeno(1,2,3-cd)pyrene	-	0.18 U	0.10 U	0.20 U	0.10 U	0.18 U	0.18 U	0.11 U	0.19 U	0.10 U	0.18 U	0.18 U
1-Methylnaphthalene		0.18 U	NA	NA	NA	0.18 U	0.053 J	NA	NA	NA	0.18 U	0.18 U
2-Methylnaphthalene	-	0.18 U	0.035	NA	0.10 U	0.18 U	0.080 J	0.049	NA	0.10 U	0.18 U	0.077 J
Naphthalene	1,500	0.18 U	0.029	0.20 U	0.10 U	0.18 U	0.24	0.050	0.19 U	0.10 U	0.18 U	0.20
Phenanthrene	-	0.39	0.040	0.21	0.10 U	0.18 U	0.58	0.046	0.13 J	0.10 U	0.18 U	0.77
Pyrene	1,100	0.061 J	0.10 U	0.080 J	0.10 U	0.18 U	0.18 U	0.11 U	0.094 J	0.10 U	0.18 U	0.16 J